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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,652	08/07/2003	Keizo Ohta	723-1414	8790
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NIXON & VANDERHYE, P.C. 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
			EXAMINER THOMASSON, MEAGAN J	
			ART UNIT 3714	PAPER NUMBER
			MAIL DATE 02/06/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/635,652

Applicant(s)

OHTA, KEIZO

Examiner

MEAGAN THOMASSON

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendments

The examiner acknowledges the addition of claims 8-10. Claims 1-10 are pending in this application.

Claim Rejections 35 U.S.C. 103(a)

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1,6,7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bilodeau et al. (US 6,384,822 B1) in view of Higashiyami (US 2002/0036638 A1).

Regarding claims 1,6 and 7, Bilodeau discloses game device, method, and computer-readable storage medium for storing a shadow volume generation program

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that causes a computer to generate a shadow volume used for rendering a shadow cast by an object placed in a three-dimensional virtual space, wherein the shadow volume generation program causes the computer to execute the steps of writing a Z value corresponding to each pixel within a predetermined area including at least the shadow casting object, into a Z-buffer (col.1, lines 35-38, 50-51), using a light source placed in the virtual space and generating a shadow volume using a plurality of polygons with regard to a direction perpendicular to a surface of the plane object in accordance with the Z value of each pixel written in the Z-buffer (col. 2, lines 21-35), the Z value of each pixel written in the Z-buffer being unchanged during shadow volume generation (col. 2, lines 35-40).

Bilodeau does not specifically disclose using a light source placed in the virtual space as a view point, and generating the shadow volume from a plane object by determining a position of each vertex of a plurality of polygons composing the plane object. However, in an analogous shadow volume generation invention, Higashiyami discloses a light source placed in the virtual space as a viewpoint (Fig. 4, viewpoint "V"). Further, Higashiyami discloses generating the shadow volume from a plane object by determining a position of each vertex of a plurality of polygons composing the plane object (¶0036). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Bilodeau and Higashiyami as Bilodeau discloses maintaining location information for polygons composing a plane object (Fig. 2, P1,P2,P3; col. 2, lines 49-67). Further, all of the claimed elements were known at the time of the invention and one of ordinary skill in the art could have combined the

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elements using known methods with no change in their respective functions and the combination would have yielded predictable results to one of ordinary skill in the art.

Claims 2-5 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bilodeau et al. (US 6,384,822 B1) in view of Higashiyami (US 2002/0036638 A1) as applied above, and further in view of Matsumoto (US 5,043,922).

Regarding claim 2, Bilodeau/Higashiyami disclose the shadow volume generation technique as described above. Further, Bilodeau teaches of a plane object composed of a plurality of polygons, each polygon having a combination of an X,Y and Z coordinate (Fig.2). *Bilodeau/Higashiyami do not specifically disclose a shape of the plane object is defined by a plurality of vertices, each having different combination of an X-coordinate and a Z-coordinate, and in the shadow volume generation step, a Y-coordinate of each vertex of the plane object is determined in accordance with the Z value of each pixel written in the Z-buffer.* However, Matsuyama teaches the element of a shape of the plane object is defined by a plurality of vertices, each having different combination of an X-coordinate and a Z-coordinate (Matsuyama, col. 7, lines 26-56), and in the shadow volume generation step, a Y-coordinate of each vertex of the plane object is determined in accordance with the Z value of each pixel written in the Z-buffer (Matsuyama, col. 7, lines 9-56). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the elements disclosed by Bilodeau, Higashiyami and Matsumoto as all inventions are in the shadow volume generation field

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of endeavor. Further, all of the claimed elements were known at the time of the invention and one of ordinary skill in the art could have combined the elements using known methods with no change in their respective functions and the combination would have yielded predictable results to one of ordinary skill in the art.

Regarding claim 3, Matsuyama discloses the light source is a point light source (col. 12, lines 24-57 or col. 5, line 20), and the shadow volume generation step includes a step of determining a position of each vertex of the plane object with regard to a direction parallel to a surface thereof in accordance with the Z value of each pixel written in the Z-buffer (col. 12, lines 24-57).

Regarding claim 4, Matsuyama discloses a shape of the plane object is defined by a plurality of vertices, each having a different combination of an X-coordinate and a Z-coordinate (col. 7, lines 9-55), and in the shadow volume generation step, the X-coordinate and the Z-coordinate of each vertex of the plane object are determined in accordance with the Z value of each pixel written in the Z buffer (col. 7, lines 9-55).

Regarding claim 5, Matsuyama discloses the storage medium according to claim 1, wherein the shadow volume generation program further causes the computer to execute the steps of placing the shadow volume generated at the shadow volume generation step in the virtual space in a virtual manner so that a height direction of the shadow volume Coincides with a direction of light emitted from the light source (col. 7, line 40- col. 8, line 13), and rendering the shadow of the shadow casting object using the shadow volume placed in a virtual manner (col. 7, line 40 - col. 8, line 30).

Regarding claims 8-10, Matsuyama discloses the ability to generate shadow volumes for models that have missing faces or "holes", as shown in Fig. 2(b), Fig. 3 and Fig. 4, and thus has the ability to reduce exception case handling.

Response to Arguments

Applicant's Remarks, filed November 13, 2007 have been considered but are moot in view of the new grounds of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pertinent prior art includes: Iwanaga (US 7,091,972 B2), drawn to an image generation of shadows technique utilizing a modifier volume gap region; Marshall et al. (US 6,924,798 B2), drawn to a real-time multi-resolution shadow generation invention; and Newhall, Jr. et al. (US 6,876,362 B1), drawn to an omnidirectional shadow generation technique.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to MEAGAN THOMASSON whose telephone number is (571)272-2080. The examiner can normally be reached on M-F 830-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xuan Thai can be reached on (571) 272-7147. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Meagan Thomasson
February 4, 2008


ROBERT E. PEZZUTO
SUPERVISORY PRIMARY EXAMINER